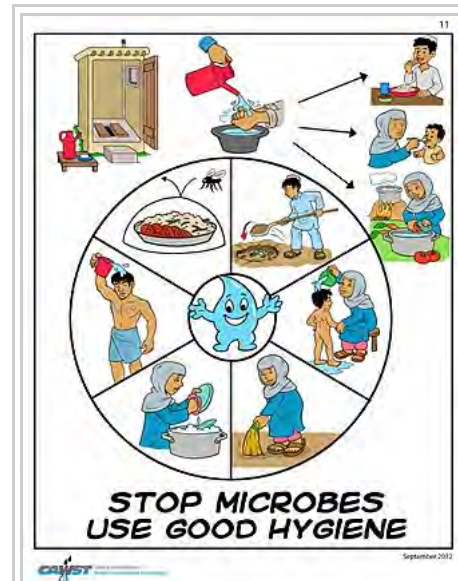


# Hygiene

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**Hygiene** is a set of practices performed for the preservation of health. According to the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases."<sup>[2]</sup>

Whereas in popular culture and parlance it can often mean mere 'cleanliness', hygiene in its fullest and original meaning goes much beyond that to include all circumstances and practices, lifestyle issues, premises and commodities that engender a safe and healthy environment. While in modern medical sciences there is a set of standards of hygiene recommended for different situations, what is considered hygienic or not can vary between different cultures, genders and age groups. Some regular hygienic practices may be considered good habits by a society while the neglect of hygiene can be considered disgusting, disrespectful or even threatening.



Poster to raise awareness about the importance of clean water for good hygiene (poster designed for use in Asian countries) by CAWST.<sup>[1]</sup>

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## Etymology

First attested in English in 1677s, the word *hygiene* comes from the French *hygiène*, the latinisation of the Greek ὑγιεινή (τέχνη) *hugieinē technē*, meaning "(art) of health", from ὑγιεινός *hugieinos*, "good for the health, healthy",<sup>[3]</sup> in turn from ὑγιής (*hugiēs*), "healthful, sound, salutary, wholesome".<sup>[4]</sup> In ancient Greek religion, Hygeia (Ἑγεία) was the personification of health, cleanliness and hygiene.<sup>[5]</sup>

## Background

Hygiene is a concept related to cleanliness, health and medicine, as well as to personal and professional care practices related to most aspects of living. In medicine and in home (domestic) and everyday life settings, hygiene practices are employed as preventative measures to reduce the incidence and spreading of disease. In the manufacture of food, pharmaceutical, cosmetic and other products, good hygiene is a key part of quality assurance i.e. ensuring that the product complies with microbial specifications appropriate to its use. The terms cleanliness (or cleaning) and hygiene are often used interchangeably, which can cause confusion. In general, hygiene mostly means practices that prevent spread of disease-causing organisms. Since cleaning processes (e.g., hand washing) remove infectious microbes as well as dirt and soil, they are often the means to achieve hygiene. Other uses of the term appear in phrases including: *body hygiene*, *personal hygiene*, *sleep hygiene*, *mental hygiene*, *dental hygiene*, and *occupational hygiene*, used in connection with public health. *Hygiene* is also the name of a branch of science that deals with the promotion and preservation of health, also called hygienic. Hygiene practices vary widely, and what is considered acceptable in one culture might not be acceptable in another.



Washing one's hands, a form of **hygiene**, is the most effective way to prevent the spread of infectious diseases

## Medical hygiene

Medical hygiene pertains to the hygiene practices related to the administration of medicine, and medical care, that prevents or minimizes disease and the spreading of disease.

Medical hygiene practices include:

- Isolation or quarantine of infectious persons or materials to prevent spread of infection.
- Sterilization of instruments used in surgical procedures.
- Use of protective clothing and barriers, such as masks, gowns, caps, eyewear and gloves.
- Proper bandaging and dressing of injuries.
- Safe disposal of medical waste.
- Disinfection of reusables (i.e. linen, pads, uniforms)
- Scrubbing up, hand-washing, especially in an operating room, but in more general health-care settings as

well, where diseases can be transmitted<sup>[6]</sup>

Most of these practices were developed in the 19th century and were well established by the mid-20th century. Some procedures (such as disposal of medical waste) were refined in response to late-20th century disease outbreaks, notably AIDS and Ebola.

## Home and everyday life hygiene

Home hygiene pertains to the hygiene practices that prevent or minimize disease and the spreading of disease in home (domestic) and in everyday life settings such as social settings, public transport, the work place, public places etc.

Hygiene in home and everyday life settings plays an important part in preventing spread of infectious diseases.<sup>[7]</sup> It includes procedures used in a variety of domestic situations such as hand hygiene, respiratory hygiene, food and water hygiene, general home hygiene (hygiene of environmental sites and surfaces), care of domestic animals, and home healthcare (the care of those who are at greater risk of infection).

At present, these components of hygiene tend to be regarded as separate issues, although all are based on the same underlying microbiological principles. Preventing the spread of infectious diseases means breaking the chain of infection transmission. The simple principle is that, if the chain of infection is broken, infection cannot spread. In response to the need for effective codes of hygiene in home and everyday life settings the International Scientific Forum on Home Hygiene has developed a risk-based approach based on Hazard Analysis Critical Control Point (HACCP), which has come to be known as "targeted hygiene". Targeted hygiene is based on identifying the routes of spread of pathogens in the home, and applying hygiene procedures at critical points at appropriate times to break the chain of infection.

The main sources of infection in the home<sup>[8]</sup> are people (who are carriers or are infected), foods (particularly raw foods) and water, and domestic animals (in the U.S. more than 50% of homes have one or more pets<sup>[9]</sup>). Additionally, sites that accumulate stagnant water—such as sinks, toilets, waste pipes, cleaning tools, face cloths—readily support microbial growth, and can become secondary reservoirs of infection, though species are mostly those that threaten "at risk" groups. Germs (potentially infectious bacteria, viruses etc.) are constantly shed from these sources via mucous membranes, faeces, vomit, skin scales, etc. Thus, when circumstances combine, people become exposed, either directly or via food or water, and can develop an infection. The main "highways" for spread of germs<sup>[8]</sup> in the home are the hands, hand and food contact surfaces, and cleaning cloths and utensils. Germs can also spread via clothing and household linens, such as towels. Utilities such as toilets and wash basins, for example, were invented for dealing safely with human waste, but still have risks associated with them, which may become critical at certain times, e.g., when someone has sickness or diarrhea. Safe disposal of human waste is a fundamental need; poor sanitation is a primary cause of diarrhea disease in low income communities. Respiratory viruses and fungal spores are also spread via the air.

Good home hygiene means targeting hygiene procedures at critical points, at appropriate times, to break the chain of infection i.e. to eliminate germs before they can spread further.<sup>[8]</sup> Because the "infectious dose" for some pathogens can be very small (10-100 viable units, or even less for some viruses), and infection can result from direct transfer from surfaces via hands or food to the mouth, nasal mucosa or the eye, 'hygienic cleaning'



Astronaut taking a hot bath in the crew quarters of the Orbital Workshop (OWS) of the Skylab space station cluster in Earth orbit. In deploying the shower facility the shower curtain is pulled up from the floor and attached to the ceiling. The water comes through a push-button shower head attached to a flexible hose. Water is drawn off by a vacuum system.

procedures should be sufficient to eliminate pathogens from critical surfaces. Hygienic cleaning can be done by:

- Mechanical removal (i.e. cleaning) using a soap or detergent. To be effective as a hygiene measure, this process must be followed by thorough rinsing under running water to remove germs from the surface.
- Using a process or product that inactivates the pathogens in situ. Germ kill is achieved using a "microbiocidal" product i.e. a disinfectant or antibacterial product or waterless hand sanitizer, or by application of heat.
- In some cases combined germ removal with kill is used, e.g. laundering of clothing and household linens such as towels and bedlinen.

## Hand hygiene

Hand hygiene is defined as hand washing or washing hands and nails with soap and water or using a waterless hand sanitizer.

Hand hygiene is central to preventing spread of infectious diseases in home and everyday life settings.<sup>[10]</sup>

In situations where hand washing with soap is not an option (e.g. when in a public place with no access to wash facilities), a waterless hand sanitizer such as an alcohol hand gel can be used. They can also be used in addition to hand washing, to minimize risks when caring for "at risk" groups. To be effective, alcohol hand gels should contain not less than 60% v/v alcohol. Hand sanitizers are not an option in most developing countries. In situations with limited water supply, there are water-conserving solutions, such as tippy-taps. (A tippy-tap is a simple technology using a jug suspended by a rope, and a foot-operated lever to pour a small amount of water over the hands and a bar of soap.<sup>[11]</sup>) In low-income communities, mud or ash is sometimes used as an alternative to soap.

The World Health Organization recommends hand washing with ash if soap is not available in emergencies,<sup>[12]</sup> schools without access to soap<sup>[13]</sup> and other difficult situations like post-emergencies where use of (clean) sand is recommended too.<sup>[14]</sup> Use of ash is common and has in experiments been shown at least as effective as soap for removing bacteria.<sup>[15]</sup>

## Respiratory hygiene

Correct respiratory and hand hygiene when coughing and sneezing reduces the spread of germs particularly during the cold and flu season.<sup>[7]</sup>

- Carry tissues and use them to catch coughs and sneezes
- Dispose of tissues as soon as possible
- Clean your hands by hand washing or using an alcohol hand sanitizer.

## Food hygiene at home



Some hygiene accessories.



A tippy tap for handwashing after using a urine-diverting dry toilet in Pumpuentsa, Ecuador

Food hygiene is concerned with the hygiene practices that prevent food poisoning. The five key principles of food hygiene, according to WHO, are:<sup>[16]</sup>

1. Prevent contaminating food with mixing chemicals, spreading from people, and animals .
2. Separate raw and cooked foods to prevent contaminating the cooked foods.
3. Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
4. Store food at the proper temperature.
5. Use safe water and raw materials

## Household water treatment and safe storage

Household water treatment and safe storage ensure drinking water is safe for consumption. Drinking water quality remains a significant problem, not only in developing countries<sup>[17]</sup> but also in developed countries;<sup>[18]</sup> even in the European region it is estimated that 120 million people do not have access to safe drinking water. Point-of-use water quality interventions can reduce diarrheal disease in communities where water quality is poor, or in emergency situations where there is a breakdown in water supply.<sup>[17][18][19][20]</sup> Since water can become contaminated during storage at home (e.g. by contact with contaminated hands or using dirty storage vessels), safe storage of water in the home is also important.

Methods for treatment of drinking water,<sup>[20][21]</sup> include:

1. Chemical disinfection using chlorine or iodine
2. Boiling
3. Filtration using ceramic filters
4. Solar disinfection - Solar disinfection is an effective method, especially when no chemical disinfectants are available.<sup>[22]</sup>
5. UV irradiation - community or household UV systems may be batch or flow-through. The lamps can be suspended above the water channel or submerged in the water flow.
6. Combined flocculation/disinfection systems – available as sachets of powder that act by coagulating and flocculating sediments in water followed by release of chlorine.
7. Multibarrier methods – Some systems use two or more of the above treatments in combination or in succession to optimize efficacy.

## Hygiene in the kitchen, bathroom and toilet

Routine cleaning of (hand, food, & drinking water) sites and surfaces (such as toilet seats and flush handles, door and tap handles, work surfaces, bath and basin surfaces) in the kitchen, bathroom and toilet reduces the risk of spread of germs.<sup>[21]</sup> The infection risk from the toilet itself is not high, provided it is properly maintained, although some splashing and aerosol formation can occur during flushing, particularly where someone in the family has diarrhea. Germs can survive in the scum or scale left behind on baths and wash basins after washing and bathing.

Water left stagnant in the pipes of showers can be contaminated with germs that become airborne when the shower is turned on. If a shower has not been used for some time, it should be left to run at a hot temperature for a few minutes before use.

Thorough cleaning is important in preventing the spread of fungal infections.<sup>[23]</sup> Molds can live on wall and floor tiles and on shower curtains. Mold can be responsible for infections, cause allergic responses,

deteriorate/damage surfaces and cause unpleasant odors. Primary sites of fungal growth are inanimate surfaces, including carpets and soft furnishings.<sup>[24]</sup> Air-borne fungi are usually associated with damp conditions, poor ventilation or closed air systems.

Cleaning of toilets and hand wash facilities is important to prevent odors and make them socially acceptable. Social acceptance is an important part of encouraging people to use toilets and wash their hands.

## Laundry hygiene

Laundry hygiene pertains to the practices that prevent or minimize disease and the spreading of disease via soiled clothing and household linens such as towels.<sup>[25]</sup> Items most likely to be contaminated with pathogens are those that come into direct contact with the body, e.g., underwear, personal towels, facecloths, nappies. Cloths or other fabric items used during food preparation, or for cleaning the toilet or cleaning up material such as faeces or vomit are a particular risk.<sup>[26]</sup>

Microbiological and epidemiological data indicates that clothing and household linens etc. are a risk factor for infection transmission in home and everyday life settings as well as institutional settings, although the lack of quantitative data directly linking contaminated clothing to infection in the domestic setting makes it difficult to assess the extent of the risk.<sup>[25][26][27]</sup> Although microbiological data indicates that risks from clothing and household linens are somewhat less than those associated with hands, hand contact and food contact surfaces, and cleaning cloths, nevertheless these risks needs to be appropriately managed through effective laundering practices. In the home, this routine should be carried out as part of a multibarrier approach to hygiene which also includes hand, food, respiratory and other hygiene practices.<sup>[25][26][27]</sup>

Infection risks from contaminated clothing etc. can increase significantly under certain conditions. e.g. in healthcare situations in hospitals, care homes and the domestic setting where someone has diarrhoea, vomiting, or a skin or wound infection. It also increases in circumstances where someone has reduced immunity to infection.

Hygiene measures, including laundry hygiene, are an important part of reducing spread of antibiotic resistant strains.<sup>[28][29]</sup> In the community, otherwise healthy people can become persistent skin carriers of MRSA, or faecal carriers of enterobacteria strains which can carry multi-antibiotic resistance factors (e.g. NDM-1 or ESBL-producing strains). The risks are not apparent until, for example, they are admitted to hospital, when they can become "self infected" with their own resistant organisms following a surgical procedure. As persistent nasal, skin or bowel carriage in the healthy population spreads "silently" across the world, the risks from resistant strains in both hospitals and the community increases.<sup>[29]</sup> In particular the data indicates that clothing and household linens are a risk factor for spread of *S. aureus* (including MRSA and PVL-producing MRSA strains), and that effectiveness of laundry processes may be an important factor in defining the rate of community spread of these strains.<sup>[25][30]</sup> Experience in the USA suggests that these strains are transmissible within families, but also in community settings such as prisons, schools and sport teams. Skin-to-skin contact (including unabraded skin) and indirect contact with contaminated objects such as towels, sheets and sports equipment seem to represent the mode of transmission.<sup>[25]</sup>

During laundering, temperature, together with the action of water and detergent work together to reduce microbial contamination levels on fabrics. During the wash cycle soil and microbes are detached from fabrics and suspended into the wash water. These are then "washed away" during the rinse and spin cycles. In addition to physical removal, micro-organisms can be killed by thermal inactivation which increases as the temperature is increased. Chemical inactivation of microbes by the surfactants and activated oxygen-based bleach used in detergents also contributes to the hygiene effectiveness of laundering. Adding hypochlorite bleach in the

washing process also achieves inactivation of microbes. A number of other factors can also contribute including drying and ironing.

Laundry detergents contain a mix of ingredients including surfactants, builders, optical brighteners, etc. Cleaning action arises primarily from the action of the surfactants and other ingredients, which are designed to maximise release and suspension of dirt and microbes into the wash liquid, together with enzymes and/or an activated oxygen-based bleach which digest and remove stains. Although activated oxygen bleach is included in many powder detergents to digest and remove stains, it also produces some chemical inactivation of bacteria, fungi and viruses. As a rule of thumb, powders and tablets normally contain an activated oxygen bleach, but liquids, and all products (liquid or powder) used for "coloureds" do not. Surfactants also exert some chemical inactivation action against certain species although the extent of their action is not known.

In 2013 the International Scientific Forum on Home Hygiene (IFH) reviewed some 30 studies of the hygiene effectiveness of laundering at various temperatures ranging from room temperature to 70 °C, under varying conditions.<sup>[31]</sup> A key finding was the lack of standardisation and control within studies, and the variability in test conditions between studies such as wash cycle time, number of rinses etc. The consequent variability in the data (i.e. the reduction in contamination on fabrics) obtained, in turn makes it extremely difficult to propose guidelines for laundering with any confidence, based on currently available data. As a result, there is significant variability in the recommendations for hygienic laundering of clothing etc. given by different agencies.<sup>[32][33][34][35][36][37][38]</sup>

Of concern is recent data suggesting that, in reality, modern domestic washing machines do not reach the temperature specified on the machine controls.<sup>[39][40]</sup>

## Medical hygiene at home

Medical hygiene pertains to the hygiene practices that prevents or minimizes disease and the spreading of disease in relation to administering medical care to those who are infected or who are more "at risk" of infection in the home. Across the world, governments are increasingly under pressure to fund the level of healthcare that people expect. Care of increasing numbers of patients in the community, including at home is one answer, but can be fatally undermined by inadequate infection control in the home. Increasingly, all of these "at-risk" groups are cared for at home by a carer who may be a household member who thus requires a good knowledge of hygiene. People with reduced immunity to infection, who are looked after at home, make up an increasing proportion of the population (currently up to 20%).<sup>[7]</sup> The largest proportion are the elderly who have co-morbidities, which reduce their immunity to infection. It also includes the very young, patients discharged from hospital, taking immuno-suppressive drugs or using invasive systems, etc. For patients discharged from hospital, or being treated at home special "medical hygiene" (see above) procedures may need to be performed for them e.g. catheter or dressing replacement, which puts them at higher risk of infection.

Antiseptics may be applied to cuts, wounds abrasions of the skin to prevent the entry of harmful bacteria that can cause sepsis. Day-to-day hygiene practices, other than special medical hygiene procedures<sup>[41]</sup> are no different for those at increased risk of infection than for other family members. The difference is that, if hygiene practices are not correctly carried out, the risk of infection is much greater.

## Home hygiene in low-income communities

In the developing world, for decades, universal access to water and sanitation has been seen as the essential step in reducing the preventable ID burden, but it is now clear that this is best achieved by programs that integrate hygiene promotion with improvements in water quality and availability, and sanitation. About 2

million people die every year due to diarrheal diseases, most of them are children less than 5 years of age.<sup>[42]</sup> The most affected are the populations in developing countries, living in extreme conditions of poverty, normally peri-urban dwellers or rural inhabitants. Providing access to sufficient quantities of safe water, the provision of facilities for a sanitary disposal of excreta, and introducing sound hygiene behaviors are of capital importance to reduce the burden of disease caused by these risk factors.

Research shows that, if widely practiced, hand washing with soap could reduce diarrhea by almost fifty percent<sup>[43][44][45]</sup> and respiratory infections by nearly twenty-five percent<sup>[46][47]</sup> Hand washing with soap also reduces the incidence of skin diseases,<sup>[48][49]</sup> eye infections like trachoma and intestinal worms, especially ascariasis and trichuriasis.<sup>[50]</sup>

Other hygiene practices, such as safe disposal of waste, surface hygiene, and care of domestic animals, are also important in low income communities to break the chain of infection transmission.<sup>[51]</sup>

## Disinfectants and antibacterials in home hygiene

Chemical disinfectants are products that kill germs (harmful bacteria, viruses and fungi). If the product is a disinfectant, the label on the product should say "disinfectant" and/or "kills" germs or bacteria etc. Some commercial products, e.g. bleaches, even though they are technically disinfectants, say that they "kill germs", but are not actually labelled as "disinfectants". Not all disinfectants kill all types of germs. All disinfectants kill bacteria (called bactericidal). Some also kill fungi (fungicidal), bacterial spores (sporicidal) and/or viruses (virucidal).

An antibacterial product is a product that acts against bacteria in some unspecified way. Some products labelled "antibacterial" kill bacteria while others may contain a concentration of active ingredient that only prevent them multiplying. It is, therefore, important to check whether the product label states that it "kills" bacteria." An antibacterial is not necessarily anti-fungal or anti-viral unless this is stated on the label.

The term sanitizer has been used to define substances that both clean and disinfect. More recently this term has been applied to alcohol-based products that disinfect the hands (alcohol hand sanitizers). Alcohol hand sanitizers however are not considered to be effective on soiled hands.

The term biocide is a broad term for a substance that kills, inactivates or otherwise controls living organisms. It includes antiseptics and disinfectants, which combat micro-organisms, and also includes pesticides.

## Body hygiene

Personal hygiene involves those practices performed by an individual to care for one's bodily health and well being, through cleanliness. Motivations for personal hygiene practice include reduction of personal illness, healing from personal illness, optimal health and sense of well being, social acceptance and prevention of spread of illness to others. What is considered proper personal hygiene can be cultural-specific and may change over time. In some cultures removal of body hair is considered proper hygiene. Other practices that are generally considered proper hygiene include bathing regularly, washing hands regularly and especially before handling food, washing scalp hair, keeping hair short or removing hair, wearing clean clothing, brushing one's teeth, cutting finger nails, besides other practices. Some practices are gender-specific, such as by a woman during her menstrual cycle. People tend to develop a routine for attending to their personal hygiene needs. Other personal hygienic practices would include covering one's mouth when coughing, disposal of soiled tissues appropriately, making sure toilets are clean, and making sure food handling areas are clean, besides other practices. Some cultures do not kiss or shake hands to reduce transmission of bacteria by contact.



Personal grooming extends personal hygiene as it pertains to the maintenance of a good personal and public appearance, which need not necessarily be hygienic. It may involve, for example, using deodorants or perfume, shaving, or combing, besides other practices.

## Excessive body hygiene

Excessive body hygiene is one example of obsessive compulsive disorder.

## Excessive body hygiene and allergies

The hygiene hypothesis was first formulated in 1989 by Strachan who observed that there was an inverse relationship between family size and development of atopic allergic disorders – the more children in a family, the less likely they were to develop these allergies.<sup>[52]</sup> From this, he hypothesised that lack of exposure to "infections" in early childhood transmitted by contact with older siblings could be a cause of the rapid rise in atopic disorders over the last thirty to forty years. Strachan further proposed that the reason why this exposure no longer occurs is, not only because of the trend towards smaller families, but also "improved household amenities and higher standards of personal cleanliness".

Although there is substantial evidence that some microbial exposures in early childhood can in some way protect against allergies, there is no evidence that we need exposure to harmful microbes (infection) or that we need to suffer a clinical infection.<sup>[53][54][55][56]</sup> Nor is there evidence that hygiene measures such as hand washing, food hygiene etc. are linked to increased susceptibility to atopic disease.<sup>[50][51]</sup> If this is the case, there is no conflict between the goals of preventing infection and minimising allergies. A consensus is now developing among experts that the answer lies in more fundamental changes in lifestyle etc. that have led to decreased exposure to certain microbial or other species, such as helminths, that are important for development of immuno-regulatory mechanisms.<sup>[57]</sup> There is still much uncertainty as to which lifestyle factors are involved.

Although media coverage of the hygiene hypothesis has declined, a strong ‘collective mindset’ has become established that dirt is ‘healthy’ and hygiene somehow ‘unnatural’. This has caused concern among health professionals that everyday life hygiene behaviours, which are the foundation of public health, are being undermined. In response to the need for effective hygiene in home and everyday life settings, the International Scientific Forum on Home Hygiene has developed a "risk-based" or targeted approach to home hygiene that seeks to ensure that hygiene measures are focussed on the places, and at the times most critical for infection transmission.<sup>[8]</sup> Whilst targeted hygiene was originally developed as an effective approach to hygiene practice, it also seeks, as far as possible, to sustain "normal" levels of exposure to the microbial flora of our environment to the extent that is important to build a balanced immune system.

## Excessive body hygiene of internal ear canals

Excessive body hygiene of the ear canals can result in infection or irritation. The ear canals require less body hygiene care than other parts of the body, because they are sensitive, and the body system adequately cares for these parts. Most of the time the ear canals are self-cleaning; that is, there is a slow and orderly migration of the skin lining the ear canal from the eardrum to the outer opening of the ear. Old earwax is constantly being



Swedish ad for toiletries, 1905/1906.

transported from the deeper areas of the ear canal out to the opening where it usually dries, flakes, and falls out.<sup>[58]</sup> Attempts to clean the ear canals through the removal of earwax can actually reduce ear canal cleanliness by pushing debris and foreign material into the ear that the natural movement of ear wax out of the ear would have removed. Excessive application of soaps, creams, and ointments can also adversely affect certain of the natural processes of the skin. For examples, soaps and ointments can deplete the skin of natural protective oils and fat-soluble content such as cholecalciferol (vitamin D3), and external substances can be absorbed, to disturb natural hormonal balances.

## Culinary (food) hygiene

Culinary hygiene pertains to the practices related to food management and cooking to prevent food contamination, prevent food poisoning and minimize the transmission of disease to other foods, humans or animals. Culinary hygiene practices specify safe ways to handle, store, prepare, serve and eat food.

Culinary practices include:

- Cleaning and disinfection of food-preparation areas and equipment (for example using designated cutting boards for preparing raw meats and vegetables). Cleaning may involve use of chlorine bleach, ethanol, ultraviolet light, etc. for disinfection.
- Careful avoidance of meats contaminated by trichina worms, salmonella, and other pathogens; or thorough cooking of questionable meats.
- Extreme care in preparing raw foods, such as sushi and sashimi.
- Institutional dish sanitizing by washing with soap and clean water.
- Washing of hands thoroughly **before** touching any food.
- Washing of hands after touching uncooked food when preparing meals.
- Not using the same utensils to prepare different foods.
- Not sharing cutlery when eating.
- Not licking fingers or hands while or after eating.
- Not reusing serving utensils that have been licked.
- Proper storage of food so as to prevent contamination by vermin.
- Refrigeration of foods (and avoidance of specific foods in environments where refrigeration is or was not feasible).
- Labeling food to indicate when it was produced (or, as food manufacturers prefer, to indicate its "best before" date).
- Proper disposal of uneaten food and packaging.

## Personal service hygiene

Personal service hygiene pertains to the practices related to the care and use of instruments used in the administration of personal care services to people:

Personal hygiene practices include:

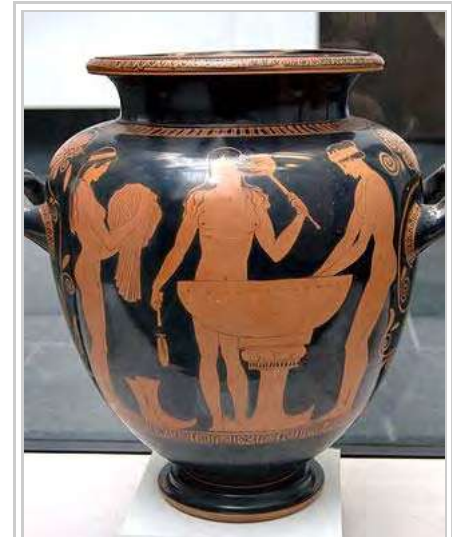
- Sterilization of instruments used by service providers including hairdressers, aestheticians, and other service providers.
- Sterilization by autoclave of instruments used in body piercing and tattoo marking.
- Cleaning hands.

## History

The earliest written account of Elaborate codes of hygiene can be found in several Hindu texts, such as the Manusmriti and the Vishnu Purana.<sup>[59]</sup> Bathing is one of the five Nitya karmas (daily duties) in Hinduism, and not performing it leads to sin, according to some scriptures.

Regular bathing was a hallmark of Roman civilization.<sup>[60]</sup> Elaborate baths were constructed in urban areas to serve the public, who typically demanded the infrastructure to maintain personal cleanliness. The complexes usually consisted of large, swimming pool-like baths, smaller cold and hot pools, saunas, and spa-like facilities where individuals could be depilated, oiled, and massaged. Water was constantly changed by an aqueduct-fed flow. Bathing outside of urban centers involved smaller, less elaborate bathing facilities, or simply the use of clean bodies of water. Roman cities also had large sewers, such as Rome's Cloaca Maxima, into which public and private latrines drained. Romans didn't have demand-flush toilets but did have some toilets with a continuous flow of water under them.

Until the late 19th Century, only the elite in Western cities typically possessed indoor facilities for relieving bodily functions. The poorer majority used communal facilities built above cesspools in backyards and courtyards. This changed after Dr. John Snow discovered that cholera was transmitted by the fecal contamination of water. Though it took decades for his findings to gain wide acceptance, governments and sanitary reformers were eventually convinced of the health benefits of using sewers to keep human waste from contaminating water. This encouraged the widespread adoption of both the flush toilet and the moral imperative that bathrooms should be indoors and as private as possible.<sup>[61]</sup>



Three young women bathing, 440–430 BC. Ancient Greece.

### Islamic hygienical jurisprudence

Since the 7th century, Islam has always placed a strong emphasis on hygiene. Other than the need to be ritually clean in time for the daily prayer (Arabic: *Salat*) through Wuzu and Ghusl, there are a large number of other hygiene-related rules governing the lives of Muslims. Other issues include the Islamic dietary laws. In general, the Qur'an advises Muslims to uphold high standards of physical hygiene and to be ritually clean whenever possible.

### Hygiene in medieval Europe

Contrary to popular belief<sup>[62]</sup> and although the Early Christian leaders, such as Boniface I,<sup>[63]</sup> condemned bathing as unspiritual,<sup>[64]</sup> bathing and sanitation were not lost in Europe with the collapse of the Roman Empire.<sup>[65][66]</sup> Soapmaking first became an established trade during the so-called "Dark Ages". The Romans used scented oils (mostly from Egypt), among other alternatives.

Northern Europeans were not in the habit of bathing: in the ninth century Notker the Stammerer, a Frankish monk of St Gall, related a disapproving anecdote that attributed ill results of personal hygiene to an Italian fashion:

*There was a certain deacon who followed the habits of the Italians in that he was perpetually trying to resist nature. He used to take baths, he had his head very closely shaved, he polished his skin, he cleaned his nail, he had his hair cut as short as if it were turned on a lathe, and he wore linen underclothes and a snow-white shirt.*

Secular medieval texts constantly refer to the washing of hands before and after meals, but Sone de Nansay, hero of a 13th-century romance, discovers to his chagrin that the Norwegians do not wash up after eating.<sup>[67]</sup> In the 11th and 12th centuries, bathing was essential to the Western European upper class: the Cluniac monasteries to which they resorted or retired were always provided with bathhouses, and even the monks were required to take full immersion baths twice a year, at the two Christian festivals of renewal, though exhorted not to uncover themselves from under their bathing sheets.<sup>[68]</sup> In 14th century Tuscany, the newlywed couple's bath together was such a firm convention one such couple, in a large coopered tub, is illustrated in fresco in the town hall of San Gimignano.<sup>[69]</sup>



*Woman's Bath*, 1496, by Albrecht Dürer

Bathing had fallen out of fashion in Northern Europe long before the Renaissance, when the communal public baths of German cities were in their turn a wonder to Italian visitors. Bathing was replaced by the heavy use of sweat-bathing and perfume, as it was thought in Europe that water could carry disease into the body through the skin. Bathing encouraged an erotic atmosphere that was played upon by the writers of romances intended for the upper class;<sup>[70]</sup> in the tale of Melusine the bath was a crucial element of the plot. "Bathing and grooming were regarded with suspicion by moralists, however, because they unveiled the attractiveness of the body. Bathing was said to be a prelude to sin, and in the penitential of Burchard of Worms we find a full catalogue of the sins that ensued when men and women bathed together."<sup>[71]</sup> Medieval church authorities believed that public bathing created an environment open to immorality and disease; the 26 public baths of Paris in the late 13th century were strictly overseen by the civil authorities.<sup>[71]</sup> At a later date Roman Catholic Church officials even banned public bathing in an unsuccessful effort to halt syphilis epidemics from sweeping Europe.<sup>[72]</sup>

Modern sanitation was not widely adopted until the 19th and 20th centuries. According to medieval historian Lynn Thorndike, people in Medieval Europe probably bathed more than people did in the 19th century.<sup>[73]</sup> Some time after Louis Pasteur's experiments proved the germ theory of disease and Joseph Lister and others put them into practice in sanitation, hygienic practices came to be regarded as synonymous with health, as they are in modern times.

## Industrial society

A social hygiene movement in the late 19th and early 20th centuries, sometimes including mental hygiene (now mental health), sexual hygiene and racial hygiene movements, was an attempt by Progressive-era reformers to prevent and control disease by changing the public's habits through the use of scientific research methods and modern media techniques. It was also based in part on eugenics, and by the 1930s thousands of forced sterilizations of people deemed undesirable took place in America each year. After 1945 when the Nazis had taken it even further, the movement was largely discredited. The drive for cleanliness persisted, however, particularly cleanliness in children. This showed many benefits such as reduced child mortality rates. It also became increasingly commercialized, however, and may have contributed to environmental pollution,

resistance to antibiotics, and even restricting the development of the immune system leading to increased incidence of diseases such as asthma or allergies.<sup>[74]</sup>

## See also

- Contamination control
- Human decontamination
- Hygiene hypothesis
- Hygiene program
- Mysophobia
- Ritual purification

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
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- International Journal of Hygiene and Environmental Health, ISSN 1438-4639 (<https://www.worldcat.org/search?fq=x0:jrn1&q=n2:1438-4639>), Elsevier

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- The International Scientific Forum on Home Hygiene (<http://www.ifh-homehygiene.org>)
- Center for Hygiene and Health in the home and community, Simmons College, Boston, USA (<http://www.simmons.edu/hygieneandhealth/>)
- Hygiene Centre, London School of Hygiene and Tropical Medicine (<http://www.hygienecentral.org.uk/The>)
- Water Supply and Sanitation Collaborative Council (<http://www.wsscc.org/>)
- IRC International water and Sanitation Centre (<http://www.irc.nl/>)
- A virtual exhibition on the history of bathing (<http://www.mheu.org/en/bathing/>)
- Centers for Disease Control on hand hygiene in healthcare settings (<http://www.cdc.gov/handhygiene/>)
- Home Economics Archive: Tradition, Research, History (HEARTH) (<http://hearth.library.cornell.edu/>)



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